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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/568,496	ROBINSON ET AL.	
	Examiner	Art Unit	
	YOSIEF BERHANE	2419	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02/20/2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 February 2009* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *01/29/2009*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-21 have been examined and are pending.

Information Disclosure Statement

2. An initialed and dated copy of Applicant's IDS form 1449 submitted 01/29/2009 is attached to the instant office action.

Response to Arguments:

3. On page 24 of Applicants Response, with regards to the obviousness-type double patenting, applicant argues that the claims in the earlier related application require generation of status data which includes the position of the device as well as a "forwarding direction"

The examiner respectfully disagrees with applicants arguments for the following reason. Paragraph 0022-0025 of the instant application, applicant discloses that status data comprises "the position of the device" and a "forwarding direction". Thus the examiner maintains the Obviousness-type double patenting rejection.

Furthermore, on pages 28 of Applicants Response, with regards claims 1-3, 12 and 16, applicant argues: "status data" was erroneously interpreted and is defined as relating to the separation of the device from other devices, where the separation refers to the distance between one node and adjacent ones.

The argument is persuasive but moot over the newly presented prior art.

Claim Objections

4. Claims 20 and 21 are objected to because of the following informalities: Spelling/Grammar. Appropriate correction is required.

As per claim 20, applicant recites: an ad hoc mobile network **[within]** they happen to be within communication range of each other.

For the purposes of examining, the claim will be understood to read " an ad hoc mobile network **[wherein]** they happen to be within communication range of each other"

Double Patenting

A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct

from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

The subject matter claimed in the instant application is fully disclosed in the referenced copending application and would be covered by any patent granted on that copending application since the referenced copending application and the instant application are claiming common subject matter, as follows:

5. Claim 1-4,7,12-16 and 15-16 provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1-6,11,12 and 16 of copending Application No. 10/560,617 (hereinafter referred to as just 'Copending application').

Although the conflicting claims are not identical, they are not patentably distinct from each other because both the instant application and the copending application disclose using a scalar status value to relay data. The claim of both applications recites similar limitations, the difference being that in claims 1 of the instant application, applicant recites "a status value which varies from its own status value in a manner indicative that payload data may be forwarded to it ". The copending application however, discloses "identifying from the status data a receiving device to which the payload data is to be forwarded, the receiving device being located in a position indicated by the forwarding direction".

However, the copending application is only reciting a broader limitation of the same scope as the instant application. Therefore, claims 1-4,7,12-16 and 15-16 of the instant application are broader versions of copending claims 1-6,11,12 and 16 of Copending Application, thereby making it obvious over the copending claims.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

As per claim 1, the instant application recites: a data relay device, the device having receiving means for receiving payload data from a data source (Claim 1, Copending application discloses a mobile data wireless relay device, the device having: receiving means for receiving payload data from a data source),

a buffer for storing payload data for subsequent transmission (Claim 1, Copending application discloses a buffer for storing payload data for subsequent transmission),

means for receiving status data from similar devices (Claim 1, Copending application discloses means for receiving status data from similar devices),

status data generation means for generating status data, the status data being derived from the quantity of data in the buffer store and the status data received from other devices (Claim 1, Copending application discloses status data generation means for generating status data, the status data being derived from the quantity of data in the buffer store and the status data received from other devices),

and comprising data relating to the separation of the device from other devices (Claim 1, Copending application discloses and comprising data relating to the position of the device),

the quantity of data in the buffer store means for determining a scalar status value (Claim 1, Copending application discloses the quantity of data in the buffer store a scalar forwarding value and a forwarding direction),

determined by the quantity of data stored in the buffer and its separation from nearby sensors (Claim 1, Copending application discloses the status data being derived from the quantity of data in the buffer store and the status data received from other devices, and comprising data relating to the position of the device)

status transmitter means for transmitting the status value to other devices (Claim 1, Copending application discloses status transmitter means for transmitting status data to other devices)

selection means for identifying, from the status data received from other devices, a receiving device having a status value which varies from its own status value in a manner indicative that payload data may be forwarded to it (Claim 1, Copending application discloses

selection means for identifying from the status data a receiving device to which the payload data is to be forwarded, the receiving device being located in a position indicated by the forwarding direction.),

and payload transmission means for transmitting the payload data to the identified receiving device (Claim 1, Copending application discloses payload transmission means for transmitting the payload data to the receiving device).

As per claim 2, the instant application recites a data relay device according to claim 1, comprising means for receiving payload data transmitted by other similar devices (Claim 2, Copending application discloses a mobile data wireless relay device according to claim 1, comprising means for receiving payload data transmitted by other similar devices).

As per claim 3, the instant application recites a data relay device according to claim 1, further comprising a data source (Claim 3, Copending application discloses a mobile data wireless relay device according to claim 1, further comprising a data source).

As per claim 4, the instant application recites a data relay device according to claim 1, wherein the selection means is arranged to only identify a suitable receiving device if the scalar status value meets one or more threshold criteria (Claim 4, Copending application discloses a mobile data wireless relay device according to claim 1, wherein the selection means is arranged to only identify a suitable receiving device if the scalar forwarding value meets a threshold criterion.).

As per claim 7, the instant application recites a data relay device according to any claim 1, further comprising condition-monitoring means for monitoring the expected lifetime of the device, and adjusting the scalar status value accordingly (Claim 5, Copending application

discloses a mobile data wireless relay device according to claim 1, further comprising condition-monitoring means for monitoring the expected lifetime of the device, and adjusting the scalar forwarding value accordingly).

As per claim 12, the instant application recites a method of operating a plurality of data relay devices, comprising (Claim 6, Copending application discloses a method of operating a plurality of mobile data wireless relay devices):

collecting data in buffer stores in one or more such devices (Claim 6, Copending application discloses collecting data in buffer stores in one or more such devices),

exchanging status data between the devices (Claim 6, Copending application discloses exchanging status data between the devices),

the status data comprising data relating to the separation between the devices (Claim 6, Copending application discloses the status data comprising data relating to the positions of the devices,),

the quantity of data in their buffer stores each device defining, from the status data, a scalar status value (Claim 6, Copending application discloses the quantity of data in their buffer stores each device defining, from the status data, a forwarding direction towards which the payload data in its buffer store is to be forwarded.)

determined by the quantity of data stored in the buffer and its separation from other sensors (Claim 1, Copending application discloses the status data being derived from the quantity of data in the buffer store and the status data received from other devices, and comprising data relating to the position of the device)

transmitting the status value to other devices and receiving the status values of other devices (Claim 6, Copending application discloses exchanging status data between the devices)

identifying, from the status data received from other devices, a receiving device having a status value which varies from its own status value in a manner indicative that payload data may be forwarded to it (Claim 1, Copending application discloses identifying from the status data a receiving device to which the payload data is to be forwarded, the receiving device being located in a position indicated by the forwarding direction.)

and transmitting the payload data to the identified receiving device (Claim 6, Copending application discloses transmitting the stored payload data to a device located in the forwarding direction).

As per claim 13, the Copending application teaches a method according to claim 12, wherein data is only transmitted from a first device to a second device located in its forwarding direction if the scalar status value derived from the status data meets one or more predetermined threshold criteria (Claim 11, Copending application discloses wherein data is only transmitted from a first device to a second device located in its forwarding direction if a scalar forwarding value derived from the status data exceeds a predetermined value).

As per claim 15, Copending application teaches a method according to claim 12, wherein the status data includes a measure of the expected lifetime of the device (Claim 12, Copending application discloses wherein the status data includes a measure of the expected lifetime of the device).

A method according to claim 12, wherein payload data is transmitted, by means of one or more of the wireless relay devices, to a target sink device defined by a predetermined scalar

status value (Claim 6, Copending application discloses the quantity of data in their buffer stores each device defining, from the status data, a forwarding direction towards which the payload data in its buffer store is to be forwarded).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. **Claims 1-7, 12-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Publication 2003/0204587 to Billhartz and further in view of Patent 5,115,433, to Baran et al. (Baran)

As per claim 1, 12 and 16, a data relay device, the device comprising (Fig. 6, box 40, as well as paragraph 0049, Billhartz discloses a mobile node (claimed relay device)):

having receiving means for receiving payload data from a data source (Fig. 6, box 42, “transmitter/receiver”, Billhartz);

a buffer store for storing payload data for subsequent transmission (Fig. 7, box 86, Billhartz discloses a buffer to store traffic (claimed payload));

means for directly receiving a scalar status data value from similar data relay devices, when within communication range thereof (Paragraph 0055, Billhartz discloses querying other nodes within a

range for information regarding at least one QoS metric , and processing the QoS metric information received);

status data generation means for generating status data (Fig. 7, box 56, as well as paragraph 0050 Billhartz discloses a route metric info unit that generates a QoS route metric),

the status data being derived from the quantity of data in the buffer store (Paragraph 0053, Billhartz discloses that the QoS route metric may be based on node queue size)

and the scalar status data value received directly from other devices (Paragraph 0055, Billhartz discloses querying other nodes within a range for information regarding at least one QoS metric , and processing the QoS metric information received),

and comprising data relating to the quantity of data in the buffer store (Paragraph 0053, Billhartz discloses that the QoS route metric may be based on node queue size);

means for determining a scalar status value (Fig. 7, box 60, Billhartz discloses a QoS tag calculation unit for calculating the node QoS tag value to make traffic admission control decisions.)

determined by the quantity of data stored in the buffer (Paragraph 0053, the QoS tag is a function of a specific QoS metric which includes node queue size (claimed quantity of data stored in the buffer) as well as end-to-end delay (claimed separation));

status transmitter means (Fig. 6, box 42, "transmitter/receiver", Billhartz)

for directly transmitting the scalar status value to other neighboring devices within communication range thereof (Paragraph 0055, Billhartz discloses querying other nodes within a range for information regarding at least one QoS metric , and processing the QoS metric information received. Note, the query is for a QoS metric, which is received by a node in range, thus it is clear from the reference that the nodes are equipped to transmit the QoS metric);

selection means (Fig. 7, box 58, Billhartz discloses a route selection unit)

for identifying, from the scalar status data values directly received from other devices, a receiving device (Paragraph 0050, Billhartz discloses a route selection unit that selects a route to the destination node (claimed receiving device) based upon the QoS route metrics (claimed scalar status data)),

having a scalar status value which varies from its own scalar status value in a predetermined manner indicating that payload data may be forwarded to it (Paragraph 0058, Billhartz discloses a node using a QoS tag (claimed scalar status value) to allow only high priority packets to be forwarded to the node));

and payload transmission means for transmitting the payload data directly to the identified receiving device (Fig. 6, box 42, "transmitter/receiver", Billhartz).

Billhartz does not expressly disclose: comprising data relating to a separation distance of the device from other devices within communication range thereof.

Baran discloses, in Col. 3, lines 65-68, as well as Col.4, lines 1-10, Each node of the network collects or is otherwise provided with information about the quality of communication between itself and its neighboring nodes within its communication range. When a data packet has been received at a node, it is routed further through the network based on criteria where the criteria include distance (claimed separation), network delay, data priority, and power requirements. Also see Col. 8, lines 3-7 as well as col. 7 lines 11-22.

Billhartz and Baran are analogous art because they are from same field of endeavor dealing specifically with routing data packets on a network based on link metrics.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the system of Billhartz by computing data relating to a separation distance between nodes, as suggested by Baran.

The suggestion/motivation for doing so would have been maximize power efficiency of mobile nodes when routing data packets on a network (Col. 3, lines 59-64, Baran)

Therefore, it would have been obvious to combine Baran with Billhartz for the benefit of maximizing power efficiency of mobile nodes when routing data packets, to obtain the invention as specified in claim 1.

As per claim 2, the combination of Billhartz and Baran teach means for receiving payload data transmitted by other similar devices (Fig. 6, box 42, "transmitter/receiver", Billhartz).

As per claim 3, the combination of Billhartz and Baran teach a data source (Paragraph 0034, Billhartz discloses a source node).

As per claim 4, the combination of Billhartz and Baran teach wherein the selection means is arranged to only identify a suitable receiving device if the scalar status value meets one or more threshold criteria (Paragraph 0050, Billhartz discloses a route selection unit that selects a route to the destination node (claimed receiving device) based upon the QoS route metrics (claimed threshold criteria)).

As per claim 5, the combination of Billhartz and Baran teach a threshold criterion is that the remaining battery power is at least sufficient to transmit all the data currently in the buffer (Paragraph 0066, Billhartz discloses that a node uses criteria for deciding whether to support a given flow request, for example, a node that is running low on battery power may not want to support a given traffic flow).

As per claim 6, the combination of Billhartz and Baran teach having means for selecting a threshold criterion as a function of elapsed time from a predetermined start point (Paragraph 0050, Billhartz discloses a route selection unit that selects a route to the destination node based upon the QoS route metrics (claimed threshold criterion). Where, as disclosed in paragraph 0053, the QoS metric includes end-to-end delay (claimed elapsed time). Also see paragraph 0076).

As per claim 7, the combination of Billhartz and Baran teach condition-monitoring means for monitoring expected lifetime of the device (Paragraph 0053, Billhartz discloses that a QoS metric may be based on available power.),

and adjusting the scalar status value accordingly (Paragraph 0058, Billhartz discloses that a node that finds itself forwarding many packets, whose battery is running out may advertise his routes and connectivity to certain other nodes with a tag that disallows all but the most important (high priority) packets).

As per claim 13, the combination of Billhartz and Baran teach wherein data is only transmitted from a first device to a second device located in its forwarding direction if the scalar status value derived from the status data meets one or more predetermined threshold criteria (Paragraph 0058, Billhartz discloses that a node that finds itself forwarding many packets, whose battery is running out may advertise his routes and connectivity to certain other nodes with a tag that disallows all but the most important (high priority) packets).

As per claim 14, the combination of Billhartz and Baran teach wherein a threshold criterion is that the remaining battery power is at least sufficient to transmit all the data currently in the buffer (Paragraph 0066, Billhartz discloses that a node uses criteria for deciding whether to support a given flow request, for example, a node that is running low on battery power may not want to support a given traffic flow).

As per claim 15, the combination of Billhartz and Baran teach wherein the status data includes a measure of the expected lifetime of the device (Paragraph 0053, Billhartz discloses that a QoS metric may be based on available power.).

As per claim 16, the combination of Billhartz and Baran teach wherein payload data is transmitted, by means of one or more of the wireless relay devices, to a target sink device defined by a predetermined scalar status value (Paragraph 0050, Billhartz discloses a route selection unit that selects a route to the destination node (claimed receiving device) based upon the QoS route metrics (claimed scalar status data)).

7. **Claims 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Billhartz and Baran as applied to claims 1-7, 12-16 and 16 above, and further in view of NPL document Non-Patent Literature, "Power-Aware Localized Routing in Wireless Networks" by Ivan et al (Hereinafter Ivan).

As per claim 8, the combination of Billhartz and Baran do not expressly disclose: wherein the separation distance between devices is determined from the power required to make a transmission between them

The reference is silent on the claim language wherein the separation between devices is determined from the power required to make a transmission between them.

However Ivan discloses that if nodes can adjust their transmission power by knowing the location of their neighbors, then a power metric can be used that depends on distance between nodes. The distance between neighboring nodes can be estimated on the basis of incoming signal strengths. Section 1.1 titled "Minimize energy required per routing task".

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Billhartz by using power requirement as a metric for determining the distance between nodes as suggested by Ivan. The modification would benefit the system of Billhartz by obtaining a measuring criterion for routing data that will allow minimizing the power consumption of the ad-hoc network as well as minimizing the energy required to route data to nodes within an ad-hoc network.

8. **Claims 9-10, 17-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Billhartz and Baran as applied to claims 1-7, 12-16 and 16 above, and further in view of Patent 6,735,448 to Krishnamurthy et al (hereinafter Krishnamurthy)

As per claim 9, The combination of Billhartz and Baran do not expressly disclose: means for determining the power that would be required to transmit payload data to an identified receiving device, and means for generating a scalar status value related to that power requirement.

However, in Col. 5, lines 19-27, Krishnamurthy discloses that Each node in the wireless ad-hoc network is equipped with a squelch circuit wherein the squelch circuit requires that the received signal power be greater than a minimum power level, MinRecvPower. The value of MinRecvPower helps determine the power level at which a mobile node has to transmit in order to directly reach a neighboring node..

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Billhartz by using power requirement as a metric or link cost used for determining routing information as suggested by Krishnamurthy. The modification would benefit the system of Billhartz by improving the efficiency of determining route paths while minimizing the power consumption utilized in an ad-hoc network.

As per claim 10, The combination of Billhartz, Baran and Krishnamurthy teach wherein the identified receiving device on which the power determination is based on the device selected for transmission on a previous determination (Col. 5, lines 7-17, Krishnamurthy discloses that link costs are chosen to be the transmitted powers. Therefore, the objective is to route the packet from the

source to the destination through the minimum power path. Note, since link costs are based on transmitted powers, the same receiving device may be selected more then once if it is determined that the same receiving device is to be used in order to achieve the minimum power path).

As per claim 17, The combination of Billhartz, Baran and Krishnamurthy teach wherein the power that would be required to transmit payload data to an identified receiving device is determined, and a scalar status value is generated related to that power requirement (Col. 5, lines 19-27, Krishnamurthy discloses that Each node in the wireless ad-hoc network is equipped with a squelch circuit wherein the squelch circuit requires that the received signal power be greater than a minimum power level, MinRecvPower. The value of MinRecvPower helps determine the power level at which a mobile node has to transmit in order to directly reach a neighboring node. Furthermore, in Col. 5, lines 7-17, Krishnamurthy discloses that link costs are chosen to be the transmitted powers.).

As per claim 18, The combination of Billhartz, Baran and Krishnamurthy teach wherein the identified receiving device on which the power determination is based is the device selected for transmission on a previous determination (Col. 5, lines 7-17, Krishnamurthy discloses that link costs are chosen to be the transmitted powers. Therefore, the objective is to route the packet from the source to the destination through the minimum power path. Note, since link costs are based on transmitted powers, the same receiving device may be selected more then once if it is determined that the same receiving device is to be used in order to achieve the minimum power path).

As per claim 11 and 19, a device according to claim 9, wherein the scalar status value h is determined by the value (N+k) C/B (Fig. 7, box 56, as well as paragraph 0050 Billhartz discloses a route metric info unit that generates a QoS route metric)

where N=number of packets of data currently in the buffer (Paragraph 0053, Billhartz discloses that the QoS route metric may be based on node queue size)

B=battery level (Paragraph 0053, Billhartz discloses that the QoS route metric may be based on available power)

C=power requirement of forwarding to the identified receiving device. k is a constant (Col. 5, lines 19-27, Krishnamurthy discloses that Each node in the wireless ad-hoc network is equipped with a squelch circuit wherein the squelch circuit requires that the received signal power be greater than a minimum power level, MinRecvPower. The value of MinRecvPower helps determine the power level at which a mobile node has to transmit in order to directly reach a neighboring node.).

9. **Claims 9-10, 17-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Billhartz and Baran as and further in view of Publication 2005/0207376 to Ashwood-Smith et al. (hereinafter Ashwood)

As per claim 20, a method of collecting data from distributed mobile data sensors respectively associated with mobile data relay devices communicating with each other in an ad hoc mobile network wherein they happen to be within communication range of each other, said method comprising (Paragraph 0016, Billhartz discloses a mobile ad hoc network having a plurality of mobile nodes (claimed sensors), and a plurality of wireless communication links (thus within a communication range) connecting the plurality of mobile nodes together. Further, Billhartz discloses the mobile nodes include a traffic information buffer to store the traffic information in a traffic database):

collecting sensor data in buffer stores of each said mobile data relay device (Fig. 7, box 86, Billhartz discloses an excess traffic buffer for storing excess traffic. Also, Fig. 6, box 46, Billhartz discloses a memory. Thus the mobile nodes in the ad-hoc network are equipped to store data);

generating a scalar status value in each said mobile data relay device based on current local status parameters including at least the amount of collected sensor data currently accumulated in its buffer store (Fig. 7, box 56, as well as paragraph 0050 Billhartz discloses a route metric info unit that generates a QoS route metric, where as disclosed in paragraph 0056, the QoS metrics including available power, available bandwidth by the node, recent error rate, recent delay, and node queue size (claimed accumulation in buffer store), are known locally to the node)

and its separation distance from other of said mobile data relay devices (Baran discloses, in Col. 3, lines 65-68, as well as Col.4, lines 1-10, Each node of the network collects or is otherwise provided with information about the quality of communication between itself and its neighboring nodes within its communication range. When a data packet has been received at a node, it is routed further through the network based on criteria where the criteria include distance (claimed separation), network delay, data priority, and power requirements. Also see Col. 8, lines 3-7 as well as col. 7 lines 11-22.);

communicating respective said scalar status values between said mobile data relay devices that happen to be within communication range of each other (Paragraph 0055, Billhartz discloses querying other nodes within a range for information regarding at least one QoS metric , and processing the QoS metric information received);

where the received sensor data is stored in its buffer store for later similar transfer to yet another device (Fig. 7, box 86, Billhartz discloses an excess traffic buffer for storing excess traffic. Also, Fig. 6, box 46, Billhartz discloses a memory. Thus the mobile nodes in the ad-hoc network are equipped to store data).

The combination of Billhartz and Baran do not expressly disclose: at each said mobile data relay device, evaluating received scalar status values from other devices with respect to its own scalar status value; and if said evaluation satisfies a predetermined condition for an identified one of the other devices, then transmitting at lest part of its accumulated sensor data from its buffer store to said identified other device.

Ashwood discloses in Paragraph 0009, distance calculation messages are used to set distance values on sensors relative to collectors on the network. The distance values enable messages to be routed only toward the collectors. Also see Paragraph 0023.

Billhartz, Baran and Ashwood-Smith are analogous art because they are from same field of endeavor dealing specifically with routing data packets on a network based on link metrics.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the combination of Billhartz and Baran to evaluate received scalar status values from other devices with respect to its own scalar status value in order to relay data to a collector as suggested by Ashwood-Smith.

The suggestion/motivation for doing so would have been to increasing the efficiency of managing and collecting data in a sensor network by using metrics to route data to a collector (Paragraph 0009, Ashwood-Smith)

Therefore, it would have been obvious to combine Ashwood with Baran and Billhartz for the benefit of maximizing power efficiency of mobile nodes when routing data packets, to obtain the invention as specified in claim 20.

As per claim 21, the combination of Billhartz, Baran, and Ashwood teach wherein: at least one higher powered data sink station also communicates with said mobile data relay devices when they happen to be within communication range (Paragraph 0070, Ashwood discloses that a distance calculation

message of distance 0 is generated by a collector (claimed high powered data sink station) and forwarded onto the network);

and said data sink station communicates a scalar status value which, when received by a data relay device, will be evaluated so as to cause the data sink station to be identified as the recipient of accumulated sensor data from the buffer store of that data relay device (Ashwood discloses in Paragraph 0009, distance calculation messages are used to set distance values on sensors relative to collectors on the network. The distance values enable messages to be routed only toward the collectors. Also see Paragraph 0023.).

Conclusion

10. Prior arts made of record, not relied upon:

US 20030063585 to Younis et al. discloses Energy aware network management

US 20030202479 to Huang et al. discloses a method and system for data in a collection and route discovery communication network

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yosief Berhane whose telephone number is (571) 270-7164. The examiner can normally be reached at 9:00-6:00 Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wing Chan can be reached at 571-272-7493. The fax phone number for the organization where this application or proceeding is assigned is. 571-273-8300

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